



A.J. Antunes & Co.

I S O 9 0 0 1 C E R T I F I E D



**180 Kehoe Blvd.
Carol Stream, Illinois 60188 USA
1-877-392-7854 (Tech Service).**

MS STEAMER TRAINING



MS

- **Warranty**
- **Specifications**
- **Steamer warnings**
- **Steamer installation**
- **Operating instructions**
- **Technical Theory of Operation**
- **Component description & functions**
- **Tools Required**
- **Steamer Maintenance**
- **Troubleshooting**
- **Parts testing & replacement**
- **Type “k” Millivolt chart**
- **Wiring diagram**

LIMITED WARRANTY

Equipment manufactured by Roundup Food Equipment Division of A.J. Antunes & Co. has been constructed of the finest materials available and manufactured to high quality standards. These units are warranted to be free from mechanical and electrical defects for a period of one year from date of purchase or 18 months from shipment from factory, whichever occurs first, under normal use and service, and when installed in accordance with manufacturer's recommendations. To insure continued proper operation of the units, follow the maintenance procedure outlined in the Owner's Manual.

1. This warranty does not cover cost of installation, defects caused by improper storage or handling prior to placing of the Equipment. This warranty does not include overtime charges or work done by unauthorized service agencies or personnel. This warranty does not cover normal maintenance, calibration, or regular adjustments as specified in operating and maintenance instructions of this manual, and/or labor involved in moving adjacent objects to gain access to the Equipment. This warranty does not cover consumable items such as the Platen, Release Sheets, Conveyor Belt Wraps, gaskets, O-rings, light bulbs, nor does it cover water contaminant problems such as foreign material in water lines or inside solenoid valves. It does not cover water pressure problems or failures resulting from improper/incorrect voltage supply. This warranty does not pay travel, mileage, or any other charges for an Authorized Service Agency to reach the equipment location.
2. Roundup reserves the right to make changes in design or add any improvements on any product. The right is always reserved to modify equipment because of factors beyond our control and government regulations. Changes to update equipment do not constitute a warranty charge.
3. If shipment is damaged in transit, the purchaser should make a claim directly upon the carrier. Careful inspection should be made of the shipment as soon as it arrives and visible damage should be noted upon the carrier's receipt. Damage should be reported to the carrier. This damage is not covered under this warranty.
4. Warranty charges do not include freight or foreign, excise, municipal or other sales or use taxes. All such freight and taxes are the responsibility of the purchaser.
5. THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, EACH OF WHICH IS HEREBY EXPRESSLY DISCLAIMED. THE REMEDIES DESCRIBED ABOVE ARE EXCLUSIVE AND IN NO EVENT SHALL ROUNDUP BE LIABLE FOR SPECIAL CONSEQUENTIAL OR INCIDENTAL DAMAGES FOR THE BREACH OR DELAY IN PERFORMANCE OF THIS WARRANTY.

SPECIFICATIONS

Electrical Ratings

Model and Mfg. Number	Voltage	Watts	Amps	Hertz
MS-150CV 9100420	208	3300	15.9	50/60
MS-150CV 9100426	230	3300	14.4	50/60
MS-150HC 9100428	230	3300	14.4	50/60
MS-250CV 9100430	208	3300	15.9	50/60
MS-250CV 9100432	208	3300	15.9	50/60
MS-250CV 9100436	230	3300	14.4	50/60
MS-250HC 9100438	230	3300	14.4	50/60
MS-155CV 9100450	208	3300	15.9	50/60
MS-155CV 9100456	230	3300	14.4	50/60
MS-155HC 9100458	230	3300	14.4	50/60
MS-255CV 9100460	208	3300	15.9	50/60
MS-255CF 9100462	120	1800	15.0	50/60
MS-255CV 9100466	230	3300	14.4	50/60
MS-255HC 9100468	230	3300	14.4	50/60
MS-355CV 9100480	208	3300	15.9	50/60
MS-355CV 9100486	230	3300	14.4	50/60

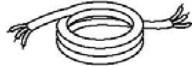
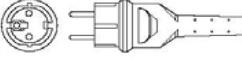
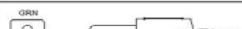
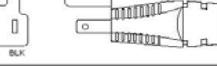
⚠ CAUTION ⚠

All electrical connections must be in accordance with local electrical codes and any other applicable codes.

⚠ CAUTION ⚠

Be sure to follow all safeguards and precautions in the Important Safety Instructions section of this manual.

Electrical Cord & Plug Configurations

Letter Code*	Description	Configuration
C	Commercial Cord	
H	Harmonized Cord	
(H)C**	CEE 7/7, 16 Amp., 250 VAC (Assembly Only).	
(C)F***	5-15P, 15 Amp., 120 VAC., Non - Locking (Assembly Only).	
(C)V***	6-20P, 20 Amp., 250 VAC., Non - Locking (Assembly Only).	

* Used in Model Designation

** Indicates that the plug comes with a Harmonized Cord

*** Indicates that the plug comes with a Commercial Cord

Model Designation

MS-150XX

TYPE OF POWER CORD
 H = HARMONIZED
 C = COMMERCIAL

TYPE OF PLUG

O = CEE 7/7 Schuko
 F = NEMA 5-15P
 V = NEMA 6-20P

50 = Timer/Spatula Model
 55 = Timer/Drawer Model

1 = Self-Contained Water Tank
 2 = Direct Water Hook-Up
 3 = Front Water Drawer

Throughout this manual, you will find the following safety words and symbols that signify important safety issues with regards to operating or maintaining the Miracle Steamer.

WARNING

GENERAL WARNING. Indicates information important to the proper operation of the equipment. Failure to observe may result in damage to the equipment and/or severe bodily injury or death.

CAUTION

GENERAL CAUTION. Indicates information important to the proper operation of the equipment. Failure to observe may result in damage to the equipment.

WARNING

ELECTRICAL WARNING. Indicates information relating to possible shock hazard. Failure to observe may result in damage to the equipment and/or severe bodily injury or death.

WARNING

HOT SURFACE WARNING. Indicates information important to the handling of equipment and parts. Failure to observe caution could result in personal injury.

WARNING

To avoid possible personal injury and/or damage to the unit, all inspections, tests, and repair of electrical equipment should be performed by **QUALIFIED SERVICE PERSONNEL**. The unit should be unplugged when servicing, except when electrical tests are required. Use extreme care during electrical circuit tests. Live circuits will be exposed.

In addition to the warnings and cautions in this manual, use the following guidelines for safe operation of the unit.

- Read all instructions before using equipment.
- For your safety, the equipment is furnished with a properly grounded cord connector.
Do not attempt to defeat the grounded connector.
- Install or locate the equipment only for its intended use as described in this manual.
Do not use corrosive chemicals in this equipment.
- **Do not operate this equipment if it has a damaged cord or plug, if it is not working properly, or if it has been damaged or dropped.**
- This equipment should be serviced by qualified personnel only. Contact the nearest Roundup authorized service facility for adjustment or repair.
- **Do not block or cover any openings on the unit.**
- **Do not immerse cord or plug in water.**
- Keep cord away from heated surfaces.
- **Do not allow cord to hang over edge of table or counter.**

The following warnings and cautions appear throughout this manual and should be carefully observed.

- Turn the unit off, disconnect the power source and allow unit to cool down before performing any service or maintenance on the unit.
- The equipment should be grounded according to local electrical codes to prevent the possibility of electrical shock. It requires a grounded receptacle with separate electrical lines, protected by fuses or circuit breaker of the proper rating.
- All electrical connections must be in accordance with local electrical codes and any other applicable codes.
- **WARNING ELECTRICAL SHOCK HAZARD. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS INJURY OR DEATH.**
- Electrical ground is required on this appliance.
- **Do not modify the power supply cord plug. If it does not fit the outlet, have a proper outlet installed by a qualified electrician.**
- **Do not use an extension cord with this appliance.**

- Check with a qualified electrician if you are in doubt as to whether the appliance is properly grounded.
- This equipment is to be installed to comply with the basic plumbing code of the Building Officials and Code Administrators, Inc. (BOCA) and the Food Service Sanitation Manual of the Food and Drug Administration (FDA).
- If the supply cord is damaged, it must be replaced by the manufacturer or its service agent, or a similarly qualified person.
- Do not clean this appliance with a water jet.
- Do not use a sanitizing solution or abrasive materials. The use of these may cause damage to the stainless steel finish.
- To ensure proper steaming characteristics, some calcium/mineral deposits must be present on the generator surface. If, during cleaning, the surface does become free of calcium / mineral deposits, one approved method is to add plain tap water to the surface and allow it to boil off. This will ensure proper steaming characteristics by creating a thin layer of deposits on the surface.
- Chlorides or phosphates in cleansing agents (such as bleach, sanitizers, degreasers or detergents) could cause permanent damage to stainless steel equipment.. The damage is usually in the form of discoloration, dulling of metal surface finish, pits, voids, holes or cracks. This damage is permanent and not covered by warranty.
- The following tips are recommended for maintenance of your stainless steel equipment,
- Always use a soft, damp cloth for cleaning, rinse with clear water and wipe dry. When required, always rub in direction of metal polish lines.
- Routine cleaning should be done daily using soap, ammonia detergent and water.
- Stains and spots should be sponged using a vinegar solution as required.
- Finger marks and smears should be rubbed off using soap and water.
- Hard water spots should be sponged using a vinegar solution.

INSTALLATION

Unpacking

1. Remove unit and all packing materials from shipping carton.
2. The unit should come with the items listed below:
 - Owner's Manual
 - Authorized Service Agency Directory
 - Inlet Hose Assembly (MS-250/225 only)
 - Spatula Assembly (MS-150/250 only)
 - Drawer Assembly (MS-155/255/355 only)

NOTE: If any parts are missing or damaged, contact Antunes Technical Service IMMEDIATELY at 1-877-392-7854 or 1-630-784-1000.

3. Remove all packing materials and protective coverings from the unit.
4. Remove and wash all removable parts in soap and water. Rinse with clean hot water and allow to air dry.
5. Wipe all surfaces of the unit with a hot, damp cloth.

NOTE: Do not use a dripping wet cloth. Wring out before use.

6. **MS-150/250 Models:** Assemble the handle, handle guard and mounting bolt to the spatula as shown in Figure 1.
7. Re-install all removed parts.

Equipment Setup

GENERAL

When placing the unit into service, pay attention to the following guidelines:

- Make sure power to the unit is off and the unit is at room temperature.
- Do not block or cover any openings on the unit.
- Do not immerse cord or plug in water.
- Keep cord away from heated surfaces.
- Do not allow cord to hang over edge of table or counter.

ELECTRICAL

1. Place the unit on a sturdy, level table or other work surface. Turn the Rocker Switch (power ON/OFF to OFF before proceeding.

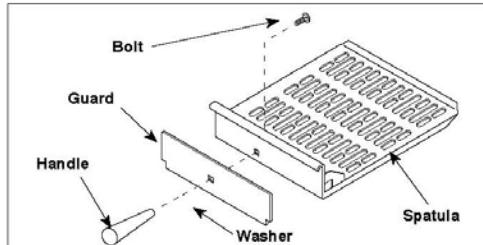


Figure 1. Assembling Handle—MS-150/250 Only

2. Ensure that the line voltage corresponds to the stated voltage on the units specification label and power cord warning tag. **If you are unsure of your Line Voltage, contact your electrician.**
3. Connect the unit to the power supply.



INSTALLATION (continued)

⚠ CAUTION ⚠

Be sure to follow all safeguards and precautions in the Important Safety Instructions section of this manual.

⚠ CAUTION ⚠

All electrical connections must be in accordance with local electrical codes and any other applicable codes.

PLUMBING

NOTE: Miracle Steamer models are designed to use cold tap water. Distilled water may be used to reduce calcium/mineral deposit build-up and reduce maintenance costs.

⚠ CAUTION ⚠

This equipment is to be installed to comply with the basic plumbing code of the Building Officials and Code Administrators, Inc. (BOCA) and the Food Service Sanitation Manual of the Food and Drug Administration (FDA).

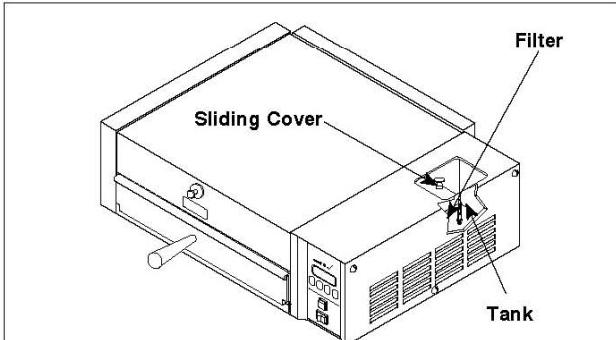


Figure 2. Filling Water Tank—MS-150/155

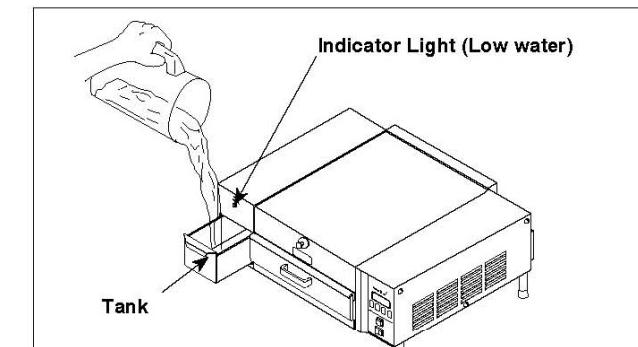


Figure 3. Filling Water Tank—MS-355

Model MS-150/155 & MS-355

The MS-150/155 & MS-355 models have a self-contained water tank. To fill the self-contained water tank:

1. **MS-150/155:** Open the sliding tank cover on top of the unit (Figure 2).

NOTE: Make sure filter inside tank is installed properly.

MS-355: Open the sliding tank drawer on the side of the unit (Figure 3).

2. Pour in **cold tap water**. The tank will hold approximately 3 quarts (2.81 liters).
3. Close the sliding tank drawer.

INSTALLATION (continued)

Models MS-250/255

▲ CAUTION ▲

Water pressure must not exceed 30 psi (2.1 kg/cm² or 207 kPa). Higher water pressures may cause poor performance or flooding. To reduce water pressure, install a water pressure regulator, and set water pressure to 20-25 psi (1.4 - 1.7 kg/cm² or 138 - 172 kPa).

These models require a direct cold water hookup. A Water Inlet Hose and Strainer Assembly (Figure 4) is supplied.

NOTE: Incoming water is controlled by a normally closed (NC) solenoid valve located inside the Steamer's electrical housing.

1. Turn off the water valve (not supplied) that supplies water to the unit (Figure 4).
2. Connect the 1/4" (6.5 mm) I.D. Flexible Tubing to the outlet side of the Water Pressure Regulator and secure using the worm clamp as shown in Figure 4.

NOTE: A Water Pressure Regulator must first be installed as shown in Figure 4. Failure to do so will result in poor steaming and possible flooding. For a single steamer, use Water Pressure Regulator P/N 7000314. For two adjacent steamers, use Water Pressure Regulator P/N 7000235.

3. Turn the water valve on.
4. Over a bucket, press and hold the white plastic tip on the Quick Disconnect Insert (Figure 4) until good, steady water flow is noted (this will purge all air out of the line). Release and note the pressure on the Water Pressure Regulator gauge. It should read 20-25 PSI. If it reads more or less, adjust the pressure by pulling the black knob upwards and turning it clockwise to increase or counter-clockwise to decrease the water pressure. Push the knob down to lock it in place.

NOTE: When adjusting the knob, you must relieve the existing pressure by pressing the white plastic tip on the Quick Disconnect Insert for 3 seconds. This allows the newly set pressure to register on the gauge. Repeat this until the gauge reads 20-25 PSI.

5. Push the Quick Disconnect Insert into the fitting at the rear of the unit until a "click" is heard (Figure 4).

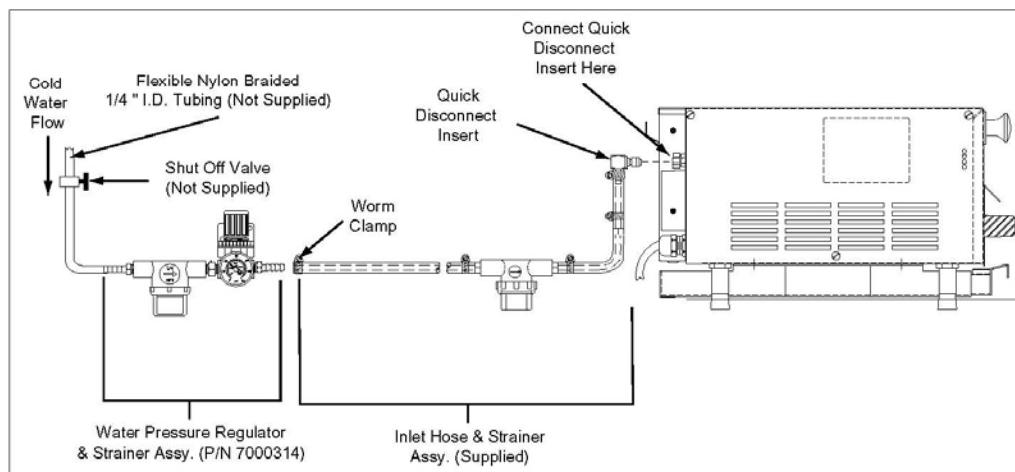


Figure 4. Connecting Water Supply to MS-250/255

OPERATION

General (All Units Except MS 250 - Mfg. #9100432)

When the Operate button (Figure 5a) is pressed, power is supplied to the water pump (MS-150/155/355) or the solenoid valve (MS-250/255). The pump/solenoid operates and water sprays onto the heated steam generator. The water flashes immediately into live steam and shoots down onto the product.

One of two operational modes can be used:
Single Shot or **Timed Cycle**

SINGLE SHOT

The Operate button is pressed to initiate a single steam shot. The control board applies power to the water pump/solenoid and a “shot” of steam occurs.

TIMED CYCLE

The control is used to set the desired cook time (up to 99 minutes, 59 seconds). When the Start/Stop button is pressed, the control board applies power to the water pump/solenoid at regular intervals for the duration of the displayed cycle time. The display counts down to zero and, when the cycle is complete, sounds an audible signal, and then reverts back to the original programmed cycle time. The unit is ready for the next cycle when the green ready light is on.

General (MS-250 - Mfg. #9100432 Only)

When the Single Shot button (Figure 5b) is pressed, power is supplied to the solenoid valve. The solenoid operates and water sprays onto the heated steam generator. The water flashes immediately into live steam and shoots down onto the product.

One of two operational modes can be used:
Single Shot or **Timed Cycle**

SINGLE SHOT

The Single Shot button is pressed to initiate a single steam shot. The control board applies power to the water solenoid and a “shot” of steam occurs.

TIMED CYCLE

The control is used to set the desired cook time (up to 99 minutes, 59 seconds). When the Operate button is pressed, the Control Board applies power to the solenoid at regular intervals for the duration of the displayed cycle time. The display counts down to zero and, when the cycle is complete, sounds an audible signal, and then reverts back to the original programmed cycle time. The unit is ready for the next cycle when the green ready light is on.

Operation continued

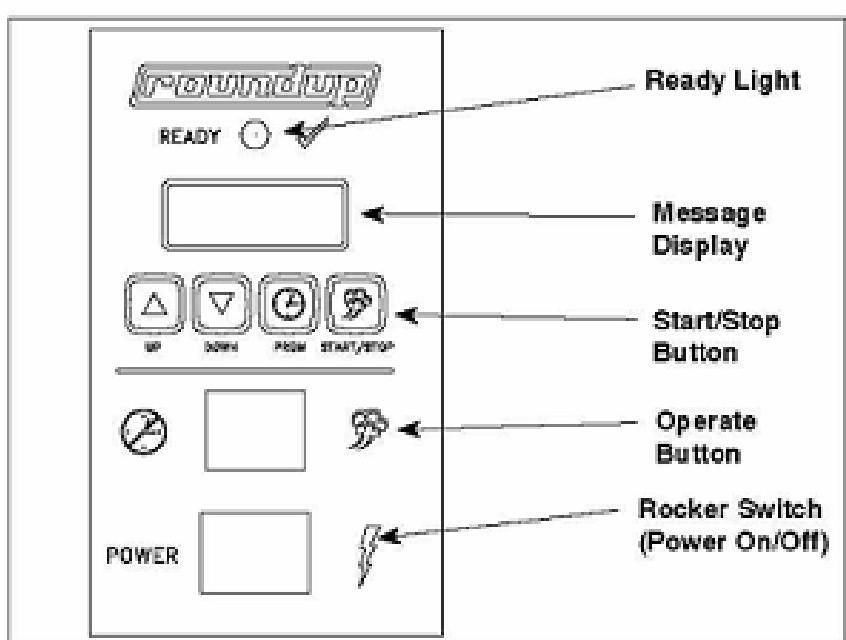


Figure 5a. Operating Controls
(all units EXCEPT MS-250 Mfg. #9100432)

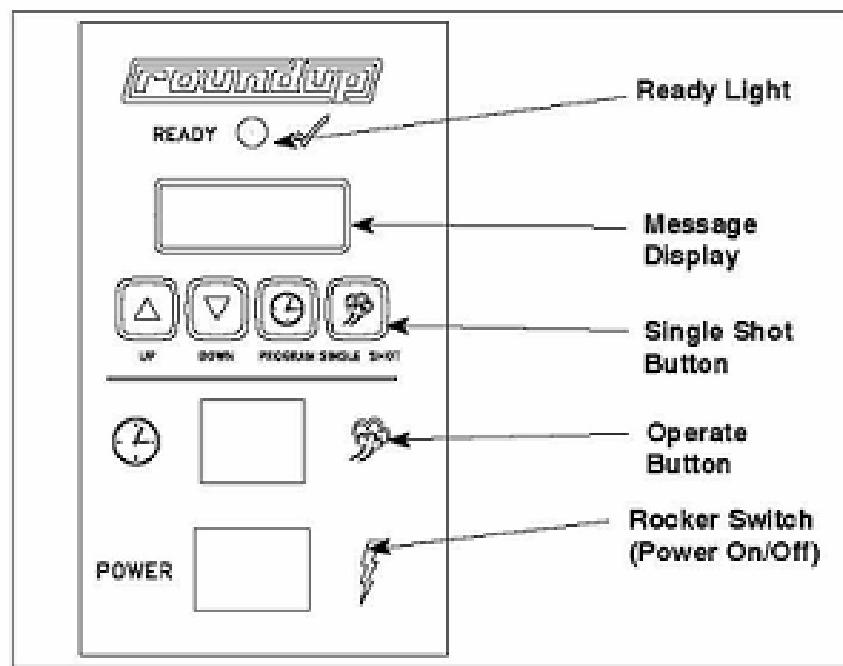


Figure 5b. Operating Controls
(MS-250 Mfg. #9100432 ONLY)

OPERATION (continued)

IMPORTANT: 208V and 220/240V Miracle Steamers are factory programmed for the following recommended settings:

- **Total Cycle Time (CYC)** = 15 min., 00 secs.
(Range: 3 seconds to 99 minutes 59 seconds)
- **Shot Interval Time (SHO)** = 00 min., 20 secs.
(Range: 3 seconds to 5 minutes 59 seconds)
- **Steam Shot Time (H₂O)** =
MS-150/155/355 - (1_00) or 1.00 second
MS-250/255 - (0_70) or 0.70 second
(Range: 0.10 second to 2.50 second)

This converts approximately 3/4 oz. (25 milliliters) of water to steam every 20 seconds for a 15 minute cooking cycle. To change any of these settings see **PROGRAMMING** on this page.

IMPORTANT: 120V Miracle Steamer is factory programmed for the following recommended settings:

- **Total Cycle Time (CYC)** = 2 min., 00 secs.
(Range: 3 seconds to 99 minutes 59 seconds)
- **Shot Interval Time (SHO)** = 00 min., 20 secs.
(Range: 3 seconds to 5 minutes 59 seconds)
- **Steam Shot Time (H₂O)** =
MS-250/255 - (0_40) or 0.40 seconds
(Range: 0.10 seconds to 2.50 seconds)

Operating Instructions (Except MS-250 - Mfg. #9100432)

1. Turn the Rocker Switch (power On/Off) to ON (Figure 5a).
2. Allow the unit to preheat for approximately 20-30 minutes.

NOTE: Do not push any of the buttons during warm-up time. The flashing green ready light indicates that the unit is NOT up to temperature. The flashing green ready light will become STEADY when the unit is up to temperature.

down to zero and an audio signal will sound at the end of the steaming cycle.

6. Remove steamed product.

⚠WARNING⚠

To avoid injury, be careful when pulling Spatula or Drawer out from unit. Be sure to allow steam to escape before putting hands or face over the steamer.

Operating Instructions (for MS-250 - Mfg. #9100432 ONLY)

1. Turn the Rocker Switch (power On/Off) to ON (Figure 5b).
2. Allow the unit to preheat for approximately 20-30 minutes.

NOTE: Do not push any buttons during warm-up time. The flashing green ready light indicates that the unit is NOT up to temperature. The flashing green ready light will become STEADY when the unit is up to temperature.

3. Pull out the spatula and place the product to be steamed onto the spatula.
4. Push the spatula fully into the steamer.
5. **Single Shot:** Press and release the Single Shot button, wait 20 seconds for the steam to penetrate the product.
Timed Cycle: Press the Operate button to begin the steaming cycle. The display will count down to zero and an audio signal will sound at the end of the steaming cycle.
6. Remove steamed product.

⚠WARNING⚠

To avoid injury, be careful when pulling spatula or Drawer out from unit. Be sure to allow steam to escape before putting hands or face over the steamer.

Operation continued

3. Pull out the Spatula or Drawer Assembly and place the product to be steamed onto the Spatula.
4. Push the Spatula or Drawer Assembly fully into the steamer.
5. **Single Shot:** Press and release the Operate button, wait 20 seconds for the steam to penetrate the product.
Timed Cycle: Press the Start/Stop button to begin the steaming cycle. The display will count

⚠WARNING⚠

To avoid injury, be careful when pulling spatula or Drawer out from unit. Be sure to allow steam to escape before putting hands or face over the steamer.

Programming

CYC (Total Cycle Time) refers to the total amount of cooking time set for the product.

SHO (Shot Interval Time) is the time set between shots of steam during a complete cycle.

H₂O setting (Steam Shot Time) is used to adjust the water volume used during each pump/solenoid operation.

OPERATION (continued)

The amount of steam produced by your Miracle Steamer depends on the amount of water sprayed onto the steam generator.

Flooding of the generator may occur if the H₂O setting is set too high. To prevent this from occurring, the Shot Interval Time (SHO) may be increased to allow more time for generator heat recovery. Adjustments should be made to both values to determine the optimum settings for your cooking needs.

To program the control, refer to Figure 6 and use the following procedure in sequence:

1. Turn the Rocker Switch (power On/Off) to ON. The display will show the factory programmed Total Cycle Time in minutes and seconds (Item A, Figure 6).
2. Press and release the Program button to change the control from OPERATION to PROGRAM mode.
3. To change the Total Cycle Time in minutes, use the UP or DOWN arrow buttons to change the time (Item B, Figure 6).
4. Press and release the Program button again, and use the UP or DOWN arrow buttons to change the Total Cycle Time in seconds (Item C, Figure 6).
5. To change the SHO factory settings, make sure the control is in PROGRAM mode, then press and hold the two arrow buttons simultaneously for 1-2 seconds and then release. SHO will be displayed (Item D, Figure 6).
6. Press and release the Program button and use the UP or DOWN arrow buttons to change the

SHO (Shot Interval Time) in seconds (Item E, Figure 6).

NOTE: 20 seconds is recommended.

7. Press and release the Program button again and use the UP or DOWN arrow buttons to change the SHO (Shot Interval Time) in minutes (Item F, Figure 6).

NOTE: 00 minutes is recommended.

8. Press and release the Program button again and H₂O will be displayed (Item G, Figure 6).
9. To change the H₂O (Steam Shot time), press and release the Program button again to display the setting (Item H, Figure 6). Use the UP or DOWN arrow buttons to increase or decrease the time.

NOTE: Recommended settings are:

- **MS-250/255 - [0_40] or 0.40 sec (120 Volt models)**
 - **MS-250/255 - [0_70] or 0.70 sec (208-240 Volt models)**
 - **MS-150/155/355 - [1_00] or 1.00 sec (208-240 Volt Models)**
10. Press either the Start/Stop, Single Shot, or Operate buttons to store the changes, exit the PROGRAM Mode and initiate the cooking cycle.

NOTE: The Start/Stop, Single Shot, or Operate buttons may be pressed at any time during programming to store the changes and exit the PROGRAM Mode.

NOTE: If no change is made within 5 seconds at any time during the programming process, all changes made up to that point are stored in memo-

Operation continued

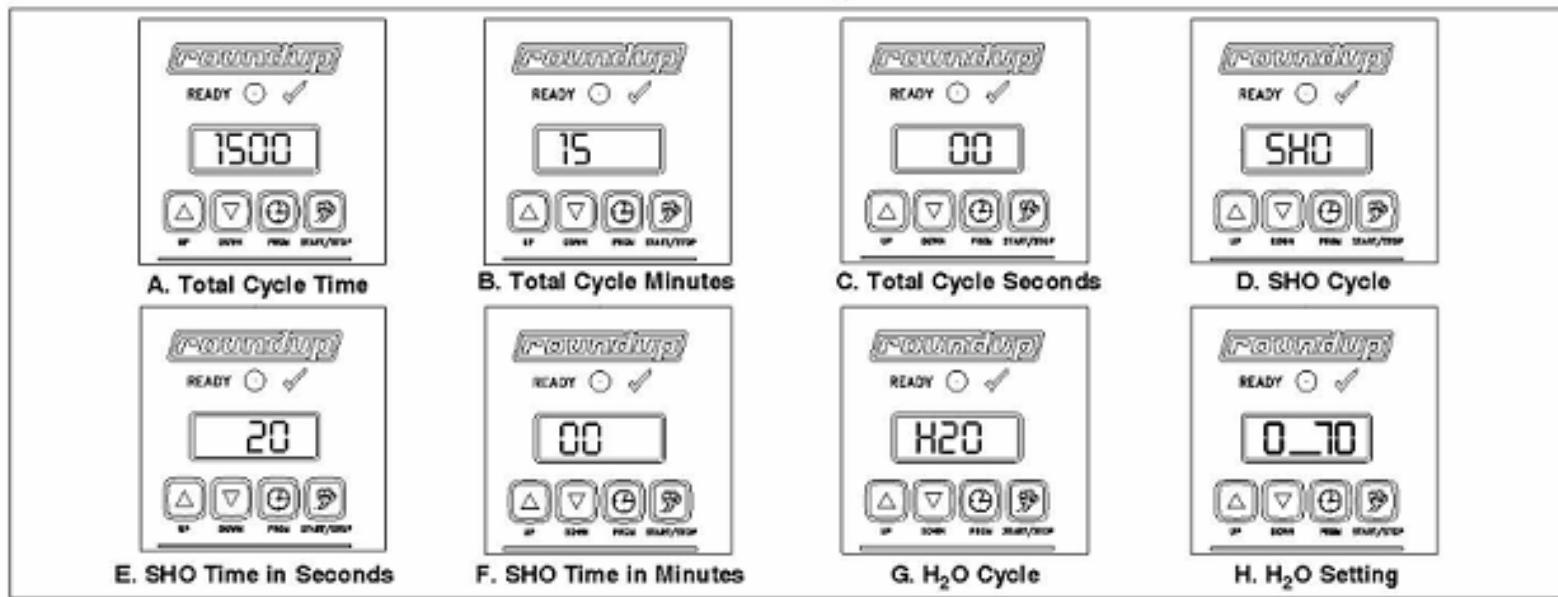


Figure 6. Control Programming Sequence

OPERATION (continued)

Steaming Tips

- Pre-cooked pasta is easily reconstituted, and gives you a hot product without the wetness of the normal “dip” method.
- Experiment with your products and different steaming times—a little more or less steam could change the appearance/flavor.
- If you serve melted cheese on sandwiches, steam is the perfect way to melt cheese.
- A steamed bun (which takes about 10-15 seconds) says “Hot Sandwich” to your customer.
- Vegetables, rice and bread products can be reconstituted by steaming before serving which reduces waste.
- Dinner rolls, muffins, even tortillas can be heated completely and held without drying out the product.
- Use a low plate or pan when steaming to allow full steam penetration and shorter steaming times.
- Use the “1 in 20” rule: Push the Operate or Single Shot Button for one second every twenty seconds. This will ensure that the product gets fully heated without using excess water or energy.
- Condensation inside the steamer is normal, but excess moisture indicates too much water is being used. Use the “1 in 20” rule above and check and adjust the programming if needed (see the Programming section of this manual).
- Heat meat and bread products apart from each other, then combine in a sandwich. This will keep the meat juices from soaking the bread.
- Finish off a special meal with a steamed hand towel—hot without excess moisture.

Hi-Limit Reset Button

A hi-limit thermostat will turn off electrical power to the steam generator if it overheats. To reset this thermostat, allow sufficient time (about 45 minutes) for the unit to cool down, remove the black cap and then fully press the black reset button located on the rear of the unit (Figure 7). If the unit requires continuous resetting, contact your Roundup authorized service agency.

Diagnostic LEDs

The Miracle Steamer's Control Board has 4 diagnostic LEDs described below:

Green (Program): When lit, indicates the unit is in Program mode.

Yellow (Audio): When lit, indicates 10-15 VDC is being supplied to the audio signal. The audio signal sounds and the LED lights for approximately 3 seconds.

Red (Heat): When lit, indicates the unit is calling for heat by supplying 10-15 VDC to the Solid State Relay. When off, indicates that the unit is satisfied.

Green (H₂O): When lit, indicates that 24 VAC is being supplied to operate the solenoid valve (MS-250/255) or water pump (MS-150/155/355).

NOTE: This LED is only lit for 1-2 seconds.

Fault Codes

When the programming parameters for Minutes/Seconds/SHO/H₂O have been inadvertently changed below or above their limits, the unit displays the “ERR” fault code. If this code appears, you must clear these settings using the procedure below:

Operation continued

Fault Codes

When the programming parameters for Minutes/Seconds/SHO/H2O have been inadvertently changed below or above their limits, the unit displays the "ERR" fault code. If this code appears, you must clear these settings using the procedure below:

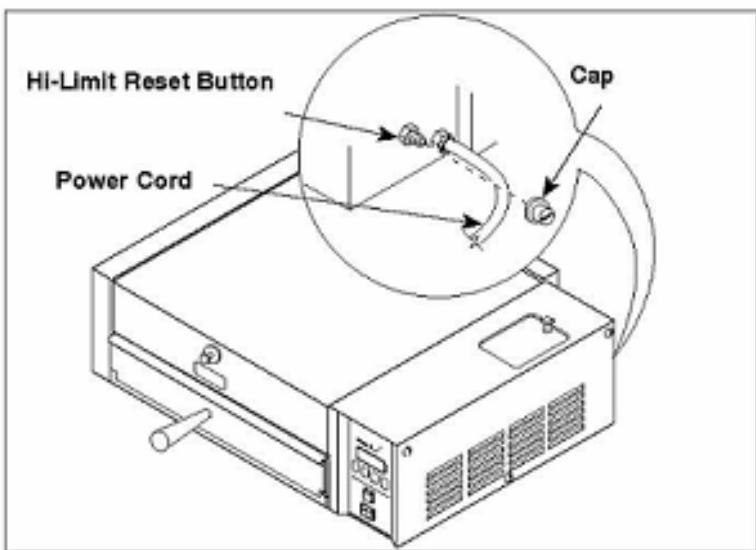


Figure 7. Hi-Limit Reset Button (MS-150 shown)

1. Turn the unit off.
2. Press and hold the Program and Start/Stop buttons simultaneously (for all units except MS-250 with Mfg. number 9100432) or Up and Down Arrow buttons for MS-250 with Mfg. number 9100432 only).
3. Turn the unit on while holding the appropriate buttons. Release the buttons when the unit stops beeping,

NOTE: Repeat Steps 1 through 4 if the unit still displays the "ERR" fault code.

4. The display will now register the cycle time.

NOTE: It is recommended that the SHO and H2O settings be adjusted to the recommended settings shown in the Programming section of this manual.

MS TECHNICAL THEORY OF OPERATION

When the power switch is on, line voltage flows to the primary side of the step down transformer. The transformer's secondary side supplies 12 & 24 VAC to the control board. Once powered, & provided that the generator temperature is below 380 F (193 C), the control board calls for heat by supplying 10-15 VDC to the solid state relay terminals 3 (+) 4 (-). Once powered, the relay closes terminals 1 & 2, which allows line voltage to flow to the generator. As the generator begins to heat up, a type "K" thermocouple monitors the internal generator temperature. As the heat continues to increase, so does the thermocouple's DC millivolts. Once the generator's temperature rises to 380-420 F (193-215 C), the thermocouple is generating approximately 7.5-9.0 DC millivolts. The control board receives these millivolts & proceeds to remove the 10-15 VDC to the solid state relay since the heating circuit has now become satisfied. Then, relay terminals 1 & 2 open up, and the generator stops heating. The heating circuit will cycle on & off as needed, even at idle. When the squared momentary button or the "Single Shot"/"Start/Stop" touch pad button is pushed, it signals the control board to supply 24 VAC to the solenoid valve used in the MS-250's/255's or the water pump used in MS-150's/155's/355's for approximately one second. The solenoid valve opens, or the water pump runs, and allows a shot of water (Approximately ¾-1 oz 25-30 ml) to flow onto the generator surface for steaming.

NOTE: If the display is in a "Timed Cycle" (Counting Down), the control board will continue to activate the solenoid valve or water pump for repeated shots of water, once every 20 seconds, and for the duration of the cycle time displayed. See Programming. Since the generator's circular cover is secured in place with a wing nut, the steam is forced downward through the generator steam ports and onto the product. The Control Board's parameters can be custom programmed for the overall cycle steam time (CYC), as well as the interval time in seconds (SHO) when each shot of water occurs, and also the water volume (H2O) used per each shot of water (See Programming). This control board incorporates several Led's for status & diagnostic purposes. See "Led Layout" in troubleshooting section of the technical manual. An audio signal will sound for 3 seconds at the end of a Timed Cycle. If the heating circuit continues to call for heat and the generator overheats, a manual resettable Hi-Limit Thermostat will trip and open the generator circuit.

NOTE: If this condition should repeat, the root cause must be determined & corrected.

MS Component Description & Function

Power Switch: Double Pole Single Throw, turns the supply voltage On or Off to the unit's internal line voltage components. **NOTE: The built in led illuminates when line voltage is present into & out of the switch. If not lit, line voltage is not present into or out of the switch.**

Squared Momentary Switch: Single Pole Single Throw, when pressed & released, it completes a low voltage circuit to the control board. The control board then initiates a timed steam cycle.

Step down Transformer: Consisting of 2 primary coils & 1 secondary coil, it steps down the incoming supply voltage to operate the low voltage components (control board, solenoid valve, SS relay input side, momentary switch). **NOTE: If supply voltage is 208-240, the Primary coils are wired in series. If supply voltage is 120 volts, they are wired in parallel.**

NOTE: The secondary coil has a center tap (Terminal 8) that supplies 12 VAC. The two outer taps, (Terminals 6 & 10) supply 24 VAC. **NOTE:** The 12 VAC operates the control board. The 24 VAC operates the solenoid valve used in (MS-250/255) or the water pump used in (MS-150/155).

Control Board: Operates & controls all the timing, steaming, signaling, diagnostic, & heating functions. **NOTE:** This control board incorporates 4 Led's for status & diagnostic purposes. See "Led Display" in Troubleshooting Section.

SS Relay: A Solid State, Single Pole Single Throw relay that is located at the rear of the unit & mounted on a heat sink. When its input coil, (Terminals 3 + & 4 -) is supplied 10-15 VDC by the control board, it allows the line voltage contacts (Terminals 1 & 2) to close. Once they close, line voltage is supplied to the generator. **NOTE: SS relays should not be tested/diagnosed with an ohmmeter since this test is not reliable. Testing/Diagnosing an SS relay should be conducted with the steamer & relay powered, and the use of a voltmeter.** If faulty, this relay will permanently fail open (No heat condition) or closed (Overheating condition). They do not fail intermittently. **NOTE: Terminals 3 (+) & 4 (-) are polarity sensitive. The wiring can be inadvertently switched at the control board or at the relay if either component is ever replaced. If so, 10-15 VDC will still be present at the relay, but it will not energize. Therefore, the generator will not heat up. Always verify per wiring diagram.**

MS Component Description & Function

Generator: Also known as a heating plate, it is a circular shaped aluminum casting consisting of a permanently integrated heating element. When powered, it generates heat to convert a shot of water (approximately ¾-1oz 25-30 ml) into steam instantaneously.

NOTE: These generators come in 120, 208, & 230 volt versions & are voltage specific. They must operate on the proper voltage supply, otherwise, they are prone to premature failure. NOTE: All generators are artificially seasoned (Limed) at the factory. A mixture of water, baking soda, & lime, is poured onto the generator surface to steam away & formulate a thin layer of calcium buildup. A thin layer is always needed for proper steaming characteristics. See "Monthly Maintenance" section.

Generator Lid: A circular shaped, gasket less lid that is secured onto the generator with a wing nut. Allows the steam to be forced down through the generator steam ports, & onto the product.

Generator Diffuser Plate: A circular shaped plate with many small orifices. Helps contain & prevent loose particles from being directed onto the food product.

Chimney: Located at the rear of the unit, it allows excessive steam in the food compartment to exit the steamer from the rear, & also allows the condensation to drain into a drip tray below it.

Thermocouple: A type "K" consisting of 2 wires, Red (-) & Yellow (+). One end plugs into the control board & the other is inserted into a hole in the generator. As it monitors the internal generator temperature, it generates & relays DC millivolts to the control board (See Millivolt Chart). **NOTE: At the control board, the thermocouple connector plugs into 3 male pins. The center pin is positive (+) & MUST always align with the yellow wire. The two outer pins are negative (-) & either one must align with the red wire.**

Hi-Limit: A capillary tube style, normally closed temperature switch that monitors the internal generator temperature. If the heating circuit fails & runs away, the hi-limit will trip (Between 550-590 F (287-310 C), & open the generator circuit. **NOTE: If the hi-limit trips, the reset button must be manually pressed to reset it. If at any time a hi-limit trips, the root cause must be determined & corrected.**

MS Component Description & Function

Solenoid Valve: Used in direct water feed units the MS-250/255, it is a normally closed 24 VAC water valve that is electrically operated for approximately one second by the control board during a steam cycle.

NOTE: The “IN” & “OUT” markings on the valve body must correspond with water flow, otherwise, the valve will leak through. If the valve is installed correctly and leaking through, debris/speck has become lodged within the plunger & body area. Disassembly & cleaning of the plunger area is simple. See “Parts Testing & Replacement Procedure” section.

Water Pump: Used in water tank equipped units the MS-150/155/355, it is a 24 VAC oscillating pump that is electrically operated for approximately 1 second by the control board during a steam cycle. It pumps water (Approximately ¾-1 oz 25-30 ml) from the tank reservoir onto the generator surface. It consists of an internal intake & discharge check valve that are replaceable.

NOTE: The arrow on the body must correspond with water flow. If the pump bleeds through, it indicates that debris has become lodged within the pump & check valves. Disassembly & cleaning of the pump & valves is simple. See “Parts Testing & Replacement Procedure” section.

Quick Disconnect Female: Used in direct water feed units the MS-250/255, it is mounted at the rear of the unit & engages with a male fitting to form a leak proof union that allows water flow to the inlet side of the solenoid valve. The union can be easily separated by pressing the quick release tab on the fitting.

Quick Disconnect Male: Used in direct water feed units the MS-250/255, it is a male elbow fitting that engages with the female fitting to allow water flow. It contains a spring loaded “white” extended nylon tip (**A retracting internal flow valve**). The barbed end of the fitting is attached to the nylon braided water supply line while the side with the “white” extended nylon tip is to be fully pushed into the female fitting until a “Click” is heard. **NOTE: The “Click” indicates the fitting is locked into position & the extended nylon tip has retracted to allow water flow.**

Generator Diffuser Plate: A circular shaped plate with many small orifices. Helps contain & prevent loose particles from being directed onto the food product

MS Component Description & Function

Audio Signal: An audio device located at the bottom of the control board. At the completion of steam cycle, the control board supplies approximately 10-15 VDC to it for 3 seconds.

NOTE: The signal can be replaced separately if it fails. It can be tested with a 9 VDC battery.

Green “Ready” light: It is located at the front of the unit and attached to the control board. When the green light blinks, it indicates the generator is not up to temperature, therefore, the unit should not be cycled during this time. When the green light is steadily on, it indicates the generator is up to operating temperature & ready for use. When the light is off, it indicates the unit is in a steam cycle.

TOOLS REQUIRED FOR PROPER TROUBLESHOOTING

- (VOM) Volt Ohm Meter (digital or analog)
- DC millivolt meter (unless integrated into VOM)
- Clamp type amp meter (digital or analog)
- Flat blade screwdriver $\frac{1}{4}$ ", $\frac{3}{16}$ "
- Open end wrench $\frac{1}{2}$ "
- Adjustable wrench 6"
- $\frac{1}{4}$ " ratchet and socket
- Channel locks
- Wire cutter, crimper, stripper
- Wire brush
- Needle nose pliers.
- Temp meter with wire type thermocouple or surface type pyrometer
(must be able to read 500° F (260 °C) or more)
- Baking soda & powdered lime & mixing container
- Teflon Tape
- Hi temp Dow Corning #736 RTV
- Portable vise

MAINTENANCE

⚠WARNING⚠

Turn the unit off, disconnect the power source and allow the unit to cool down before performing any service or maintenance on the unit.

⚠CAUTION⚠

Chlorides or phosphates in cleansing agents (such as bleach, sanitizers, degreasers or detergents) could cause permanent damage to stainless steel equipment. The damage is usually in the form of discoloration, dulling of metal surface finish, pits, voids, holes or cracks. This damage is permanent and not covered by warranty. The following tips are recommended for maintenance of your stainless steel equipment:

- Always use a soft, damp cloth for cleaning, rinse with clear water and wipe dry. When required, always rub in direction of metal polish lines.**
- Routine cleaning should be done daily using soap, ammonia detergent and water.**
- Stains and spots should be sponged using a vinegar solution.**
- Finger marks and smears should be rubbed off using soap and water.**
- Hard water spots should be sponged using a vinegar solution.**

Daily

- Turn the Rocker Switch (power On/Off) to OFF. Unplug the power cord and allow the unit to cool down before proceeding.**
- Check the Water Pressure Regulator gauge (MS-250/250 only) and verify that it reads 20 - 25 PSI (1.4 - 1.7 kg/cm² or 138-172 kPa). If not, adjust the water pressure as described in the Installation section of this manual. Check the rear water Quick Disconnect Fitting and Hose Clamp for leakage. Tighten clamps or replace parts if needed.**
- Remove the Spatula (MS-150/250 only), Drawer (MS-155/255/355 only), Liner, Drip Pan, Top Cover, and Steam Vent (Figure 8).**
- Wash items in hot, soapy water and then rinse and **WIPE DRY**.**
- Wipe down the food compartment and the entire exterior of the unit (Figure 8) with a clean, hot, damp cloth (not dripping wet) and wipe dry.**
- Reinstall the Steam Vent first, followed by the remaining items.**

NOTE: Frequency of cleaning is determined by water conditions, usage and water filtration systems.

▲ CAUTION ▲

Do not use a sanitizing solution or abrasive materials. The use of these may cause damage to the stainless steel finish.

▲ CAUTION ▲

If a chemical cleaner is used, be sure it is safe to use on cast aluminum. Observe all precautions and warnings on product label.

▲ CAUTION ▲

Unplug power cord before moving and servicing this appliance.

NOTE: Install steam vent before installing liner and drawer/spatula.

NOTE: Failure to properly clean and dry the above mentioned items prior to reassembly may result in the accumulation of water/moisture overnight. This may lead to permanent damage of the equipment's finish and its accessories. This damage is not covered by warranty.

Monthly

The Miracle Steamer utilizes an open steam generator. Water sprayed onto the generator surface flashes into steam immediately, but the minerals in the water do not steam, they stay on the generator surface. **A small amount of calcium/mineral deposits are needed for proper operation**, but a build-up of excessive calcium/mineral deposits causes poor steaming efficiency, excessive moisture (wet steam) and will eventually severely retard the steaming action completely.

MAINTENANCE (continued)

CLEANING STEAM GENERATOR

1. Turn the unit off and unplug the power cord. Allow the unit to cool down before proceeding.
2. Perform the Daily cleaning, but **DO NOT** reassemble the unit
3. Remove the wing nut, Generator Cover, and Diffuser (Figure 8). Wash these items in hot, soapy water, rinse and **WIPE DRY**.
4. With the unit cool, use a wire brush and/or scraper to loosen and remove the excessive calcium/mineral deposits from the generator surface (Figure 8). Next, take a wire brush and clean out any build up that has accumulated in the 28 steam ports (26 vertical and 2 horizontal) of the generator (Figure 8). Remove the loose build up, wipe the generator with a clean, damp cloth, and reassemble the unit.

NOTE: If deposits are still excessive and/or difficult to remove, refer to Steps 5 and 10.

5. Pour delimer solution (not supplied) onto the generator surface. Follow the delimer manufacturer's instructions for proper mixture and use.

⚠ CAUTION ⚠

If a chemical cleaner/delimer is used, be sure it is safe to use on cast aluminum. Observe all precautions and warnings on the product label.

6. Using a sponge or a dry towel, remove the delimer solution from the generator surface, then rinse with clean water.

NOTE: To ensure proper steaming characteristics, some calcium/mineral deposits must be present on the generator surface. If, during cleaning, the surface does become free of calcium/mineral deposits, add plain tap water to the surface and allow it to boil off. If necessary, repeat this process to formulate a thin coating of calcium/mineral deposits.

NOTE: In soft water areas, it may be necessary to add a small amount of lime to the generator to "season" it. This will ensure proper steaming characteristics by producing a thin coating of calcium/mineral deposits on the generator surface.

Seasoning mixture consists of 3/4 ounces (25ml/25cc) baking soda, 3/4 ounces (25ml/25cc) lime mixed with 1 quart (950ml/950cc) of water. Stir mixture and pour 1/4" deep onto the hot generator surface. After mixture is converted to steam, the remaining loose power can be removed.

7. Plug the power cord into the appropriate outlet.
8. Turn the Rocker Switch (power On/Off) to ON. Allow the unit to warm up for approximately 30 minutes.
9. Push and release the Operate button or the Single Shot button several times to operate the steamer. **This purges any remaining delimer residue from the generator surface.**
10. Turn the unit off, reinstall all parts and accessories, and return the unit to service.

MAINTENANCE (continued)

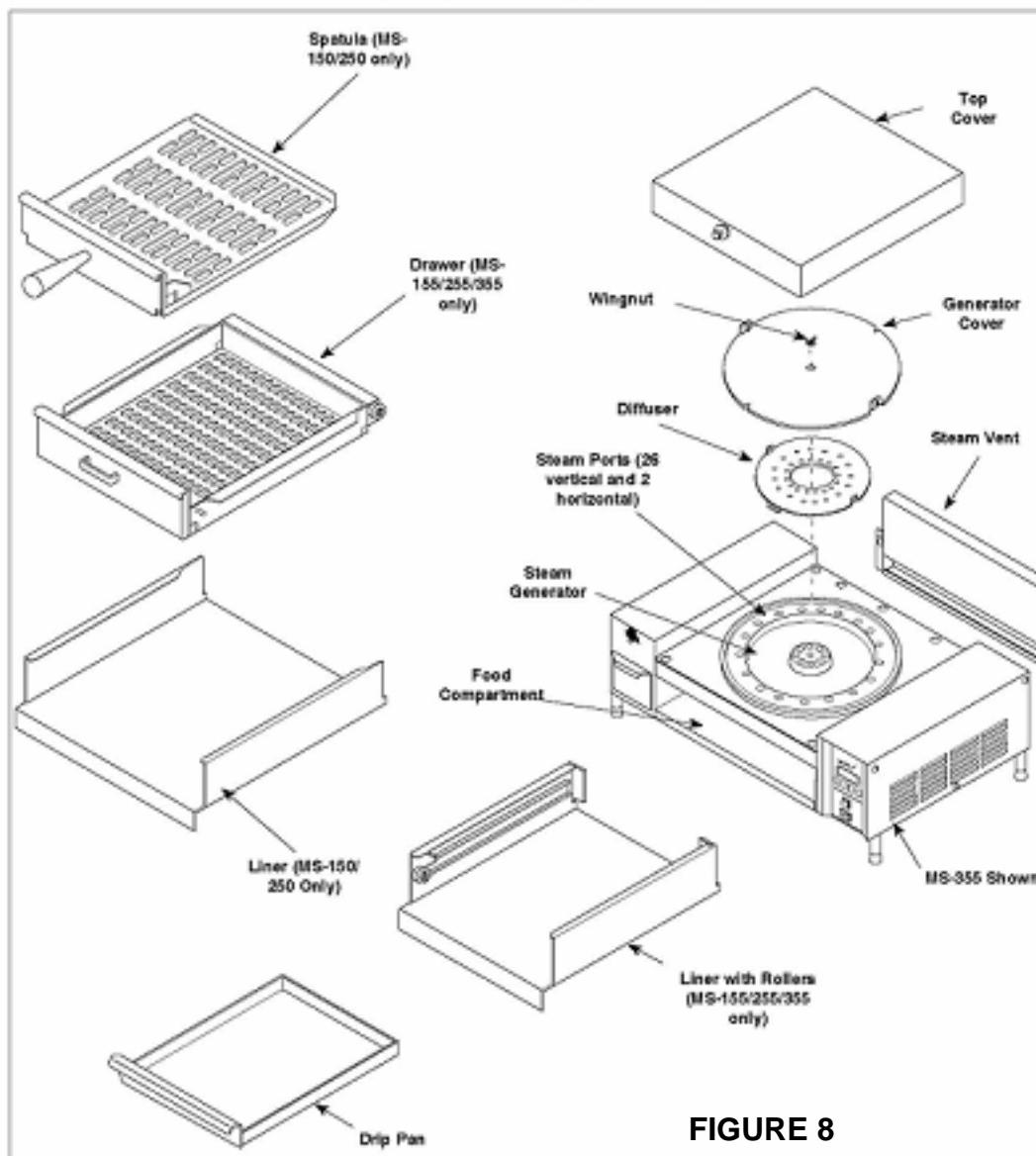


FIGURE 8

MAINTENANCE (continued)

WATER TANK FILTER-MODELS MS-150/155 ONLY

The Water Tank Filter is used to prevent solids or food products from entering and damaging the water pump. The unit uses a water filter (Figure 9). Inspect and clean this filter monthly or more regularly using the following procedure:

NOTE: The water level should be very low or near empty.

1. Turn the Rocker Switch (power On/Off) to OFF. Unplug the power cord and allow the unit to cool down before proceeding.
2. Open the Slide Door (Figure 9).
3. Remove the filter, located inside the tank, by pulling it upwards and out of the bottom hole.
4. Clean the Filter by running it under tap water. Replace the Filter if the screen is torn or damaged.

CHECKING AND CLEANING THE WATER STRAINER (MONTHLY MS-250/255 ONLY)

The Water Strainer protects your equipment from any foreign debris in the water line that could get into the food, damage the unit's solenoid (causing the unit to leak or flood) and protect from interference with the equipment's proper and consistent operation.

To ensure proper and consistent steaming results, visually check the water pressure regulator gauge and strainer cup regularly. If the pressure on the gauge has dropped, visually check the clear, plastic strainer "cup" and clean out the accumulated debris as follows.

1. Shut off the water supply valve to the unit, unscrew the clear, plastic strainer "cup" and carefully remove the mesh strainer screen.

5. Reinstall the filter stem into the bottom hole of the tank (Figure 9).
6. Fill the Water Tank and test the unit.

NOTE: The MS-355 does not use a water filter.

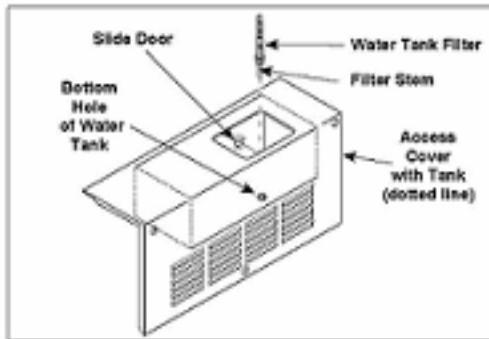
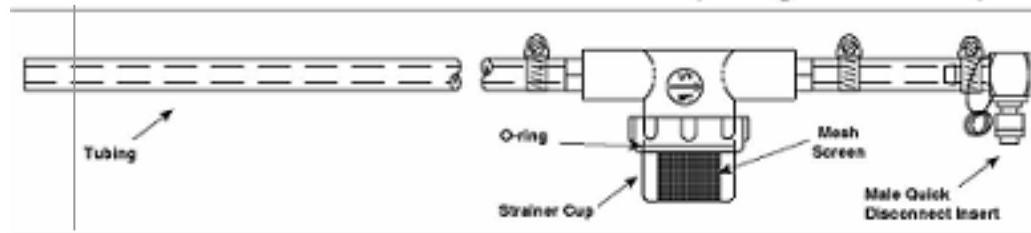


Figure 9. Water Tank Filter-MS-150/155 Only

2. At the sink, gently flush all of the accumulated debris from the strainer cup and mesh strainer. Be especially careful not to damage the mesh strainer screen.
3. Carefully place the mesh strainer screen into its seat at the bottom of the clear, plastic cup and confirm that the orange O-ring is properly seated in its place before screwing the strainer cup and top back together.
4. Purge the air out of the strainer and tubing by disconnecting the male quick disconnect insert from the equipment and, over a bucket, push the "white" plastic tip in until there is good water flow.
5. Replace damaged or worn parts as needed.
6. Verify that the Water Pressure Regulator is set to 20-25 PSI (1.4-1.7 kg/cm² or 138-172 kPa).



TROUBLE SHOOTING

Problem	Possible Cause	Corrective Action
Control Display is Blank (power On/Off switch is On but indicator light is off).	The power cord is not correctly plugged in. The power cord and/or electrical plug is damaged. The main electrical panel circuit breaker is off or has been tripped. Switch is inoperable.	Plug the power cord into the appropriate outlet. Inspect electrical wire, plug, and receptacle. Reset circuit breaker. See parts testing and replacement section of this manual See parts testing and replacement section of this manual
Control Display is blank (power On/Off switch is on and indicator light is on).	Control Board is inoperable Transformer is inoperable. Loose, burnt, or broken wires in cir-cuit.	See parts testing and replacement section of this manual “ “ “ ” “ “ “ ”
Unit does not heat up (Control Display is on)	Hi-Limit Thermostat is tripped or inoperable. Solid State Relay is inoperable. Thermocouple is inoperable. Control Board is inoperable. Steam Generator is inoperable. Loose, burnt, or broken wires in cir-cuit.	Reset the Hi-Limit Thermostat according to the Operations sec-tion of this manual. If the Hi-Limit Thermostat requires continuous resetting, See parts testing and replacement section of this manual “ “ “ ” “ “ “ ” “ “ “ ” “ “ “ ” “ “ “ ”
The unit's main electrical panel cir-cuit breaker trips.	Damaged receptacle, plug, or cord; a loose connection or an internal component failure.	Turn the unit off, allow it to cool to room temperature, and then restart the unit. See parts testing and replacement section of this manual

TROUBLE SHOOTING

Problem	Possible Cause	Corrective Action
Water leaking inside electrical housing.	Pinhole leak in rubber hoses (MS-150/155/355).	Replace hoses.
	Loose or damaged water line tubes and/or fittings inside electrical housing.	Apply teflon tape, Tighten or replace tubes and/or fittings.
“ERR” appears in the Control Display.	Programming and/or SHO and H2O values were adjusted/changed improperly.	Reset the Control Board as described in the Programming section of this manual.

Problem	Possible Cause	Corrective Action
Unit oods overnight and/or continues to steam even when in idle mode.	Solenoid Valve is leaking due to debris trapped inside the plunger (MS-250/255).	Attempt to push the debris out of the valve by rapidly operating the unit on a number of “single shot” cycles and then letting it rest. If the unit still leaks, disassemble the Solenoid Valve and clean out the plunger. Reassemble unit and test. If a leak is still present, replace the Solenoid Valve. Contact your maintenance person or Authorized Service Agency.
	Solenoid Valve is installed incorrectly (MS-250/255).	If the Solenoid Valve was replaced, verify that the “IN” and “OUT” labels on the valve correspond to the water flow.
	There is no pre-strainer or filter on the water line just before the unit (MS-250/255).	Equipment was supplied with a strainer. If missing, install strainer.

TROUBLE SHOOTING

Problem	Possible Cause	Corrective Action
Unit heats but there is little or no steam produced and/or The product requires more steaming than usual.	Water Line Valve is closed (MS-250/255).	Check that the Water Line Valve is Open
	Filter Strainer is restricted.	Check and clean the Filter Strainer.
	Quick disconnect is not fully engaged at rear of the unit or is damaged (MS-250/255).	Remove and reengage the Quick Disconnect firmly until a "click" is heard. Replace if damaged.
	Low or no water pressure in the water line (MS-250/255).	Remove the Quick Disconnect Insert from the rear of the unit. While holding over an empty cup, press the white plastic tip. Strong, steady water flow should be noted. If so, reengage firmly into unit. If not present, or pressure is low, contact your maintenance person or plumber.
	Improper water pressure to unit (MS-250/255).	Verify that a Water Pressure Regulator is installed and set to 20-25 PSI.
	Unit is not being cleaned properly (daily/monthly).	Clean unit daily and monthly as described in the Maintenance section of this manual.
	Programming and/or SHO, H2O values were adjusted/changed improperly.	Reprogram the SHO and H2O values .
	Insufficient or excessive calcium/mineral deposits on the Generator surface.	Verify that thin layer of calcium/mineral deposits is present on the Generator surface.

TROUBLE SHOOTING

Problem	Possible cause	Corrective action
	Generator surface is bare.	Generator surface must have a thin calcium/mineral coating for proper steaming. Refer to the Maintenance section of this manual.
	Generator Steam Ports are restricted.	Clean the Steam Ports as described in the Maintenance section of this manual.
	Generator Cover is warped or loose.	Verify that the Generator Cover wingnut is tight. If noticeable steam escapes around the Generator Cover, replace the cover.
	Generator Diffuser is missing.	Install Generator Diffuser or replace if missing.
	Generator surface temperature is too low.	Verify Generator surface temperature to be 380-420° F(193 - 215° C).
Excessive condensation in Food Compartment.	Water pressure is too high (MS-250/255).	Verify that the Water Pressure regulator is set to 20 - 25 PSI. Adjust accordingly.
	Programming and or SHO and H2O values were adjusted improperly.	Reprogram the SHO and H2O values as described in the Programming section of this manual.
Steam coming out around top covers or sides.	Generator Cover's wingnut is loose.	Tighten wingnut.
	Generator Cover is warped.	Replace Generator Cover.

Parts Testing & Replacement Procedures

Testing Power Switch

See Power Switch under “Component Description & Function” before proceeding.

⚠️ WARNING ⚠️

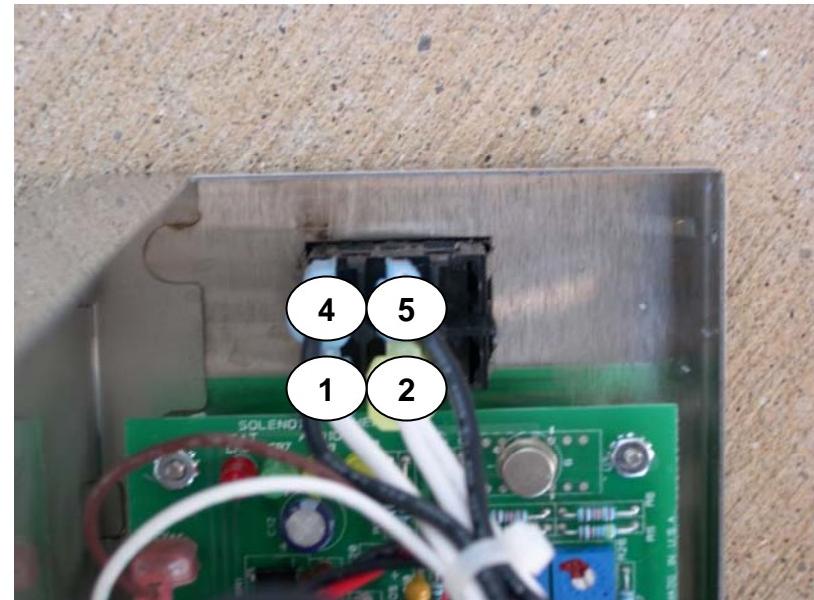
To avoid possible personal injury and/or damage to the unit, all inspections, tests, and repair of electrical equipment should be performed by QUALIFIED SERVICE PERSONNEL. The unit should be unplugged when servicing, except when electrical tests are required. Use extreme care during electrical circuit tests. Live circuits will be exposed.

TESTING POWER SWITCH

Disconnect wires to isolate switch.

Turn switch to the “On” position. Verify continuity across terminals 1 & 2, then 4 & 5. Next, turn switch to the “Off” position. Reading should now be infinity.

Replace if fails test.



Replacement Procedures

Disconnect power switch wires (Mark for reinstallation).

Squeeze locking tabs inward & push switch out towards front of unit.

Snap new switch into place until flush.

Reinstall wiring onto switch.

Test unit for proper operation.

TESTING SQUARED MOMENTARY SWITCH

See Momentary Switch under “Component Description & Function” before proceeding.

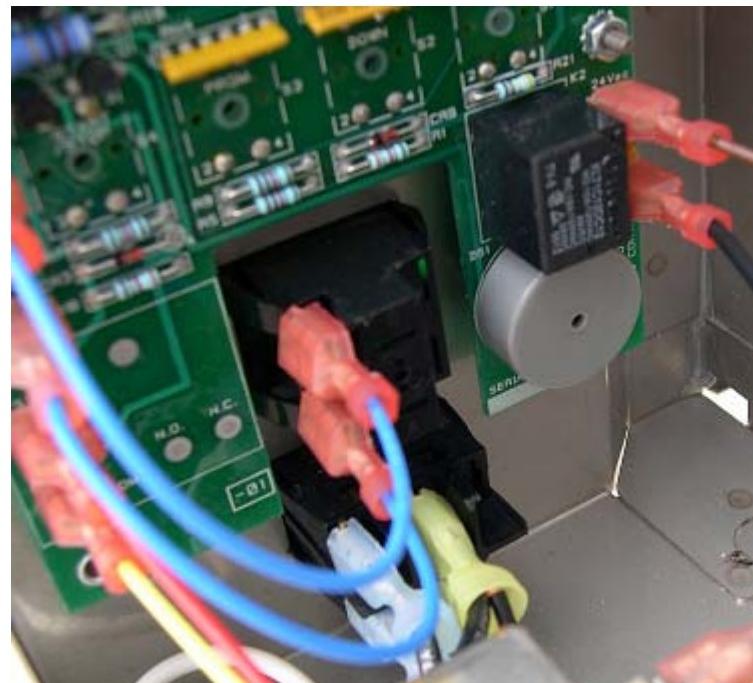
TESTING SQUARED MOMENTARY SWITCH

Disconnect wires to isolate switch.

Press & hold switch in. Verify continuity across both terminals.

Next, release switch. Reading should now be infinity.

Replace if fails test.



Replacement Procedures

Disconnect switch wires.

Squeeze locking tabs inward & push switch out towards front of unit.

Snap new switch into place until flush.

Reinstall wiring onto switch.

Test unit for proper operation.

TESTING STEPDOWN TRANSFORMER

See Transformer under “Component Description & Function” before proceeding

TESTING STEP DOWN TRANSFORMER

Disconnect wires to isolate transformer coils.

Terminals 1 & 2 (15-19 ohms)

Terminals 4 & 5 (17-23 ohms)

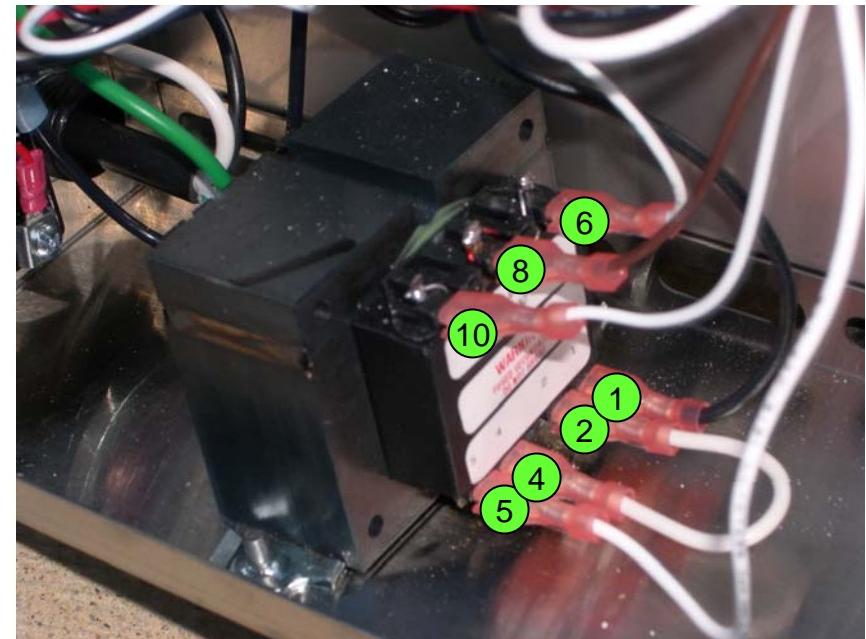
Terminals 6 & 10 (0.6 ohms)

Terminals 6 & 8 (0.3 ohms)

Terminals 8 & 10 (0.3 ohms)

All readings +/- 10%

Replace if any coil fails test.



Replacement Procedures

Disconnect transformer wires (Mark for reinstallation).

Remove the 2 screws beneath the transformer.

Install new transformer & secure into place with screws.

Reinstall the wiring onto transformer.

Test unit for proper operation.

TESTING CONTROL BOARD

See Control Board under “Component Description & Function” before proceeding.

TESTING CONTROL BOARD

Control Board must be tested while powered up
(See Technical Theory of Operation).

Check for proper VAC/VDC input & output.
Replace if it fails any of its functions.



Replacement Procedures

Disconnect control board wiring & unplug thermocouple
(Mark for reinstallation).

Remove the nuts & the control board.

Install new control board & secure with the nuts.

Reinstall the wiring & thermocouple onto control board.

Allow unit to heat up 15 minutes.

You must Program the control board per instruction sheet
(Included in kit) # 1010849.

**NOTE: Failure to program upon install may result in
improper operation.**

Test unit for proper operation.

TESTING SS RELAY

See SS Relay under “Component Description & Function” before proceeding.

TESTING SS RELAY

To determine if relay contacts are stuck closed
(Unit overheating):

Disconnect RED wire from relay terminal 3 (+).
Clamp an amp meter onto the black wire at relay
terminal 1 or 2.

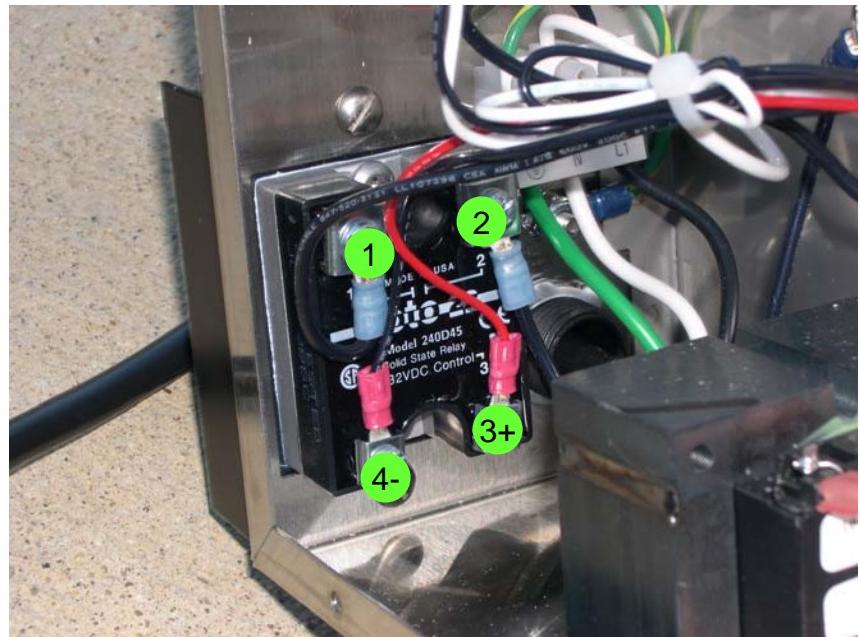
Is there any amp draw? If yes, replace relay.

To determine if relay contacts are stuck open
(Unit not heating):

Ensure the control board & relay are wired per
the wiring diagram.

Is 10-15 VDC present at relay terminals 3 (+)
& 4 (-)? If yes, is line voltage present across the
two generator terminals?

If no, replace relay.



Replacement Procedures

Disconnect the relay wiring (Mark for reinstallation).

Remove the two mounting screws & relay.

Install new relay with thermal compound (If included in kit).

Reinstall wiring onto relay.

Test unit for proper operation.

TESTING GENERATOR

See Generator under “Component Description & Function” before proceeding.

TESTING GENERATOR

Disconnect wires to isolate generator.

Verify 13 ohms +/- 1 for 208 volt generator

Verify 16 ohms +/- 1 for 230 volt generator

Verify 8 ohms +/- 1 for 120 volt generator

Check from each terminal to ground using at least a 20M scale. Reading should be infinity.

Replace if fails either test.



Replacement Procedures

Disconnect generator wiring.

Loosen brackets & remove thermocouple & hi-limit cap tube.

Remove compression nuts & steel tubes from the brass

elbow & “T” fitting. **NOTE: Flexing the Teflon tubes may be required.**

Unscrew (CCW) the brass elbow & fitting along with the teflon tubes from the generator.

Remove generator wing nut, lid, & diffuser plate.

Remove the generator's top 3 setscrews.

Cautiously, push the generator up & out of the chassis.

NOTE: Extra effort may be needed as generator is siliconed onto the chassis.

Remove remaining dried silicone from chassis.

Apply 1/8" bead of red hi-temperature silicone (Supplied in kit) onto the chassis &

the underside of the generator



GENERATOR CONTINUED

NOTE: Failure to apply silicone will allow steam to enter the electrical compartment.

Seat new generator in place & secure with new setscrews.

NOTE: Replacement generator will have artificial lime deposits on it that are required for proper steaming characteristics.

Remove excess silicone & smooth to a neat finish.

Apply Teflon tape to the threads of the Teflon tubes & screw into generator until snug.

Reinstall the steel tubes, compression nuts, & secure.

Reinstall wiring, thermocouple, hi-limit cap tube, brackets, & secure.

Allow unit to heat 15 minutes.

Run several cycles & check for leaks within electrical compartment. Repair if needed.

Reprogram the **SHO & H2O** settings if needed (**See Programming Section**).

Reinstall diffuser plate, lid, wing nut, & service panel.

NOTE: Silicone must be allowed to cure 12-24 hours before customer places unit into use.

TESTING GENERATOR LID

See Generator Lid under “Component Description & Function” before proceeding.

Ensure the wing nut is tight.

Does noticeable steam leak out the perimeter of the cover?

If yes, remove cover, check it for flatness, & observe its underside.

Does the outer ½" perimeter contain any noticeable calcium buildup?

If yes, replace cover.

NOTE: Calcium buildup at perimeter indicates that steam is leaking out from there. If perimeter is shiny, it indicates that steam is not leaking.

NOTE: Gaskets are not used in MS series.



Replacement Procedures

Remove wing nut & lid.

Install new lid & secure with wing nut.

Test unit for proper operation.

TESTING TYPE "K" THERMOCOUPLE

See Thermocouple under “Component Description & Function” before proceeding

To test thermocouple for continuity: Unplug thermocouple from control board to isolate it.

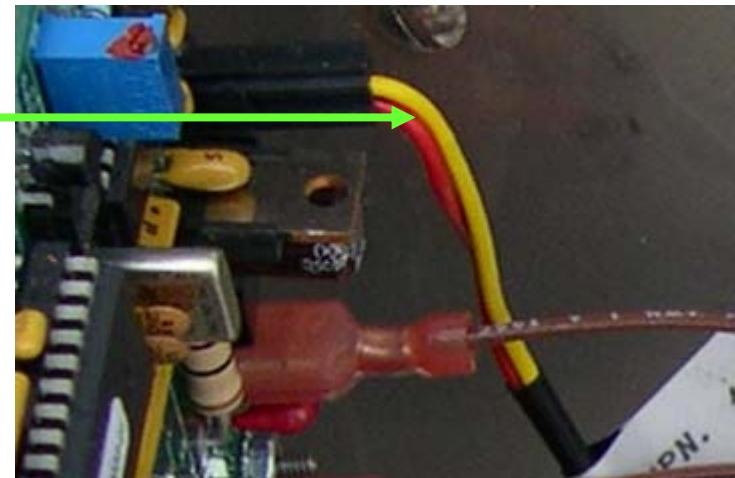
At room temperature, verify 2-3 ohms across red & yellow wire.

Replace if fails test.

To determine if an “overheating” or “under heating condition” is caused by a faulty thermocouple:

Preheat unit for 15 minutes then monitor the generator's surface, or internal temperature. Next, unplug the thermocouple from the control board. Set your VOM to the VDC scale, 50-200 MV (millivolt) range. Using the provided millivolt chart, determine if the thermocouple is generating the proper DC millivolts (+/- 1.0 millivolt) at the indicated temperature. **Quick Tip:** If the unit is under heating, the DC millivolts being generated will be much higher than what they should. If the unit is overheating, the DC millivolts being generated will be much lower than what they should be.

Replace if fails test.



Replacement Procedures

Unplug thermocouple from control board.

Loosen retainer bracket screw & remove from generator hole.

Install new thermocouple & secure to generator & control board.

Test unit for proper operation.

TESTING HI-LIMIT

See Hi-limit under “Component Description & Function” before proceeding.

To test for continuity: Disconnect wires to isolate hi-limit.

Verify continuity across the terminals.

Replace if fails test.

To determine if hi-limit is tripping prematurely: Monitor the generator's surface or internal temperature.

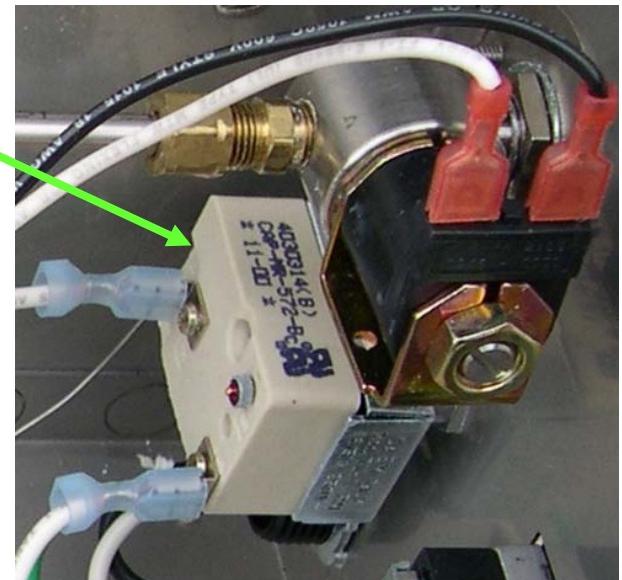
Does hi-limit trip below 450 F (232 C)? If yes, replace hi-limit.

To determine if hi-limit is tripping too late, or not at all: Short relay terminals 1 & 2 together (**This simulates an overheating condition**).

Monitor the generator's surface or internal temperature.

Does the temperature exceed 610 F (321 C)? Is the generator still drawing amperage? **If yes, replace hi-limit.**

NOTE: Reinstall any removed wiring to their original terminals.



Replacement Procedures

Disconnect hi-limit wires.

Remove lock nut & dismount the ceramic body.

Remove cap tube bracket & pull cap tube out of generator hole.

Install new hi-limit & secure with bracket & lock nut.

Reinstall wiring onto hi-limit.

Test unit for proper operation.

TESTING SOLENOID VALVE

(Direct water feed units only)

See Solenoid Valve under "Component Description & Function" before proceeding.

To test the solenoid valve coil: Disconnect wires to isolate solenoid valve coil. Verify 8-20 ohms.

Replace if fails test.

To determine if solenoid valve is leaking through: Turn power off & disconnect water line from rear.

Dry up any water that is present on the generator surface.

Once dry, reconnect the water line ONLY.

Does water begin to slowly flow onto the generator surface? If yes, disassemble & clean out solenoid valve plunger.

If still leaks, replace solenoid valve.

To Clean: Remove top nut then slide coil assembly off.

Secure the valve body with channel locks.

If the valve stem is slotted at the top, loosen & remove the stem with a sturdy screw driver. If it is not slotted, you will need the special hex nut with locking pins.

Remove the plunger, spring, o'ring.

With a cloth, gently clean out the plunger & body area. Generally, the debris/speck found will be small.

Reassemble items & recheck.

Replace if still leaks.

SEE PICTURES ON NEXT PAGE



REPLACING SOLENOID VALVE

See Solenoid Valve under “Component Description & Function” before proceeding.

Replacement Procedures

Disconnect solenoid valve wires.

Remove compression nuts & steel tubes from the brass elbow & “T” fitting.

NOTE: Flexing the Teflon tubes may be required to ease nut & tube removal.

Remove the two rear female quick disconnect screws.

Remove the solenoid/QD assembly.

Unscrew the QD from the solenoid valve body.

NOTE: Vise may be required.

Thread the QD into the new solenoid valve body.

NOTE: Apply thread sealant onto threads & verify the “IN” & “OUT” on valve.

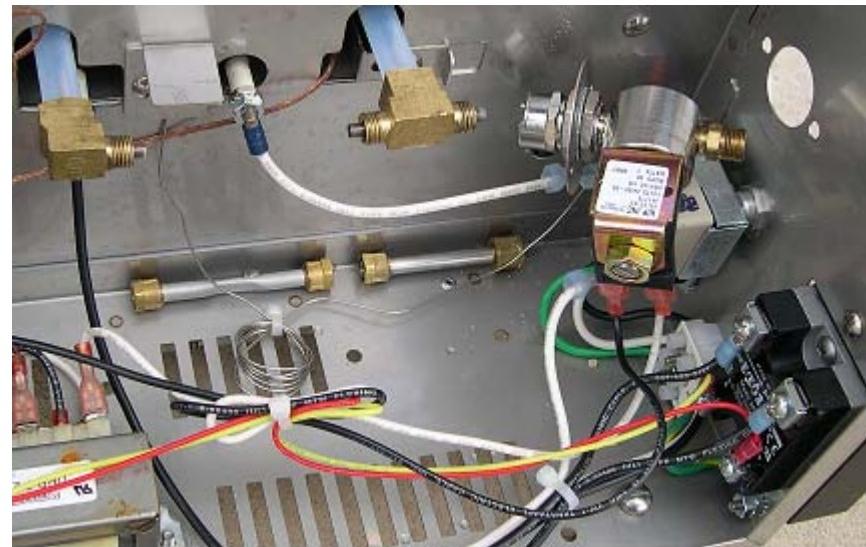
Reinstall solenoid/QD assembly & secure with screws.

Reinstall the steel tubes, compression nuts, & secure.

Allow unit to preheat 15 minutes.

Run several cycles & check for leaks within electrical compartment. Repair if needed.

Test unit for proper operation.



TESTING WATER PUMP

(Water Tank Equipped Models)

See Water Pump under "Component Description & Function" before proceeding

To Test Diode: Remove diode from pump.

Set your VOM to "Diode" check setting.

Measure across both diode terminals & note the reading. Next, reverse your VOM leads on diode & measure again. Reading should be infinity one way & 470-520 the other way.

Replace if fails test.



To Test Pump Coil: Remove diode from pump.

Verify 4-6 ohms across the 2 orange wires on pump.

Replace if fails test.



To determine if water pump is leaking through:

Turn power off & dry up any water that is present on the generator surface.

Once dry, fill the water tank with water. **NOTE: Verify the tank filter is installed & not torn or damaged.**

Does water begin to slowly flow onto the generator surface? If yes, disassemble & clean out the water pump.

If still leaks, **replace water pump.**

To Clean: Turn power off & unplug unit.

Drain the water tank.

Disconnect pump wires.

Disconnect rubber hoses from both ends of the pump.

Remove the pump's bottom mounting nuts & remove pump.

Cautiously remove the pump's two end plastic nipples.



NOTE: A check valve is behind each nipple. Make note of their color & position for proper reassembly.

Inspect both check valves. Replace if their rubber seal is torn or missing. If not torn, rinse in water.

Clean out the pump's body with water & properly reinstall the check valves & end nipples.

Remount the pump & secure with the nuts. **NOTE: Arrow on pump body should correspond with water flow**

Reinstall the rubber hoses & wiring.

Verify the water tank filter is properly installed & not torn. Replace if needed. **NOTE: MS-355 does not contain a water filter.** Fill tank with water & test for proper operation.

Replace both check valves or pump if continues to leak.

REPLACING WATER PUMP

Water Tank Equipped Models

See Water Pump under “Component Description & Function” before proceeding

Replacement procedures

Turn power off & unplug unit.

Drain the water tank.

Disconnect pump wires.

Remove rubber hoses, bottom mounting nuts, & pump.

Install new pump assembly & secure with the nuts.

NOTE: Arrow on pump body should correspond with water flow

Reinstall rubber hoses & wiring.

Verify the water tank filter is properly installed & not torn. Replace if needed.

NOTE: MS-355 does not contain a water filter.

Fill tank with water & test unit for proper operation.

TESTING QUICK DISCONNECT (FEMALE)

Direct Water Feed Units Only

See Quick Disconnect Female under "Component Description & Function" before proceeding

The Female QD is generally trouble free.

If the locking mechanism (Tab, spring, pin) are missing or damaged, the female QD must be replaced.

Replacement Procedures

Disconnect the solenoid valve wires.

Remove compression nuts & steel tubes from the brass elbow & "T" fitting.

NOTE: Flexing the Teflon tubes may be required to ease nut & tube removal.

Remove the two rear female quick disconnect screws.

Remove the solenoid/QD assembly.

Unscrew the QD from the solenoid valve body.

NOTE: Vise may be required.

Thread new QD into the solenoid valve body.

NOTE: Apply thread sealant onto threads & verify the "IN" & "OUT" on valve.

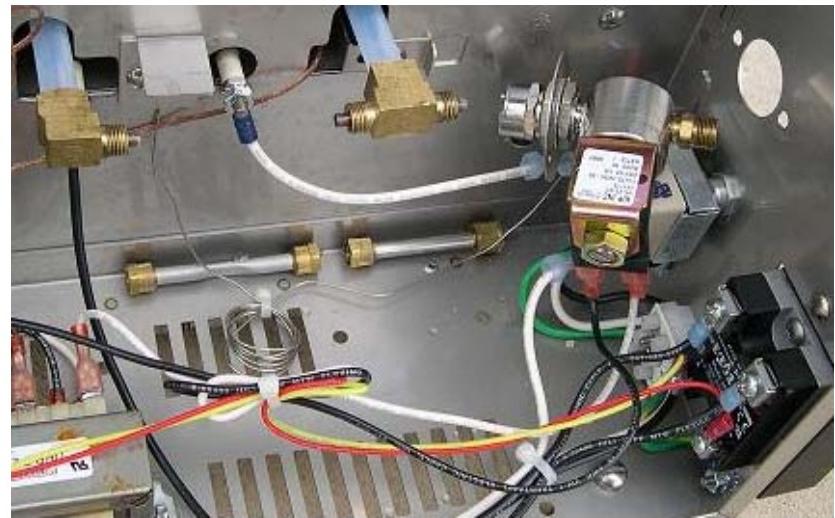
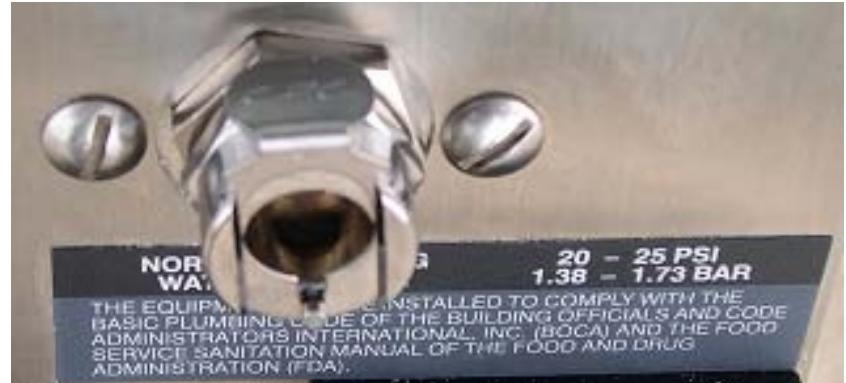
Reinstall solenoid/QD assembly & secure with screws.

Reinstall the steel tubes, compression nuts, & secure.

Allow unit to preheat 15 minutes.

Run several cycles & check for leaks within electrical compartment. Repair if needed.

Test unit for proper operation.



TESTING QUICK DISCONNECT (MALE)

Direct Water Feed Units Only

See Quick Disconnect Male under “Component Description & Function” before proceeding.

Verify the white nylon tip is not chipped, broken, or damaged.

NOTE: The tip should protrude at least 1/8".

Verify it retracts when depressed, & protrudes when released.

NOTE: If water does not flow when the tip is depressed, it generally indicates there is no water pressure in line.

If the quick disconnect leaks while engaged to the rear of the unit, the o’ring is worn or damaged & must be replaced.

Replace if fails test



Replacement Procedures

Shut off water line valve that is before the quick disconnect.

Remove clamp & quick disconnect from water line.

Install new quick disconnect & secure with clamp onto water line.

Turn water line valve on & inspect for leaks. Repair if necessary.

Engage the quick disconnect into rear of steamer until a “Click” is heard.

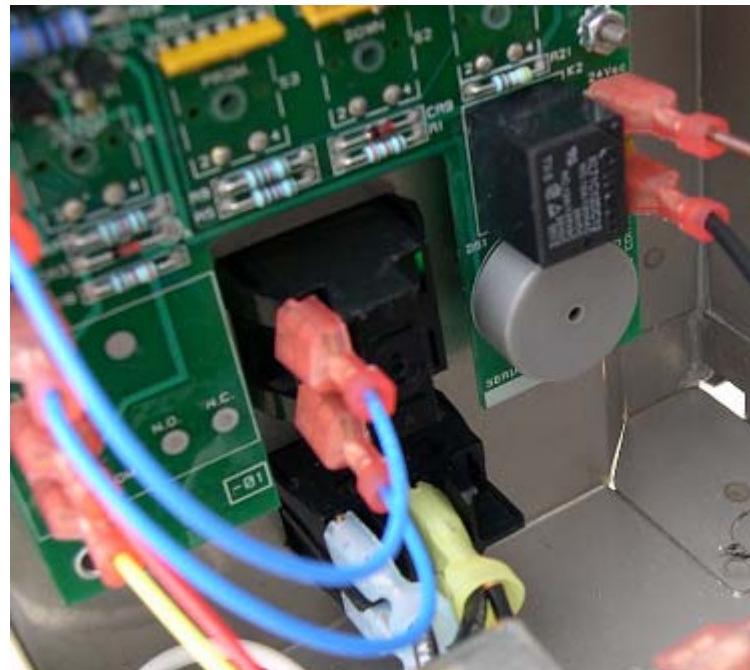
Operate unit for several cycles to purge air from line.

Test unit for proper operation

TESTING AUDIO SIGNAL

See Audio Signal under “Component Description & Function

Does the audio sound for 3 seconds towards the end of a cycle? If no, did the yellow (Audio) Led turn on for 3 seconds? If yes, replace audio signal.



Replacement Procedures

Using a small screw driver, straighten the locking pin behind the audio signal.

Pull & remove audio signal.

Install new audio signal & bend locking pin down.

Test unit for proper operation.

THERMOELECTRIC VOLTAGE IN MILLIVOLTS

TYPE "K" THERMOCOUPLE READINGS + OR - 1 MILLIVOLT

° F	MV
300	6.1
310	6.3
320	6.5
330	6.7
340	6.9
350	7.2
360	7.4
370	7.6
380	7.8
390	8.0

° F	MV
400	8.3
410	8.5
420	8.7
430	8.9
440	9.2
450	9.4
460	9.6
470	9.8
480	10.1
490	10.3

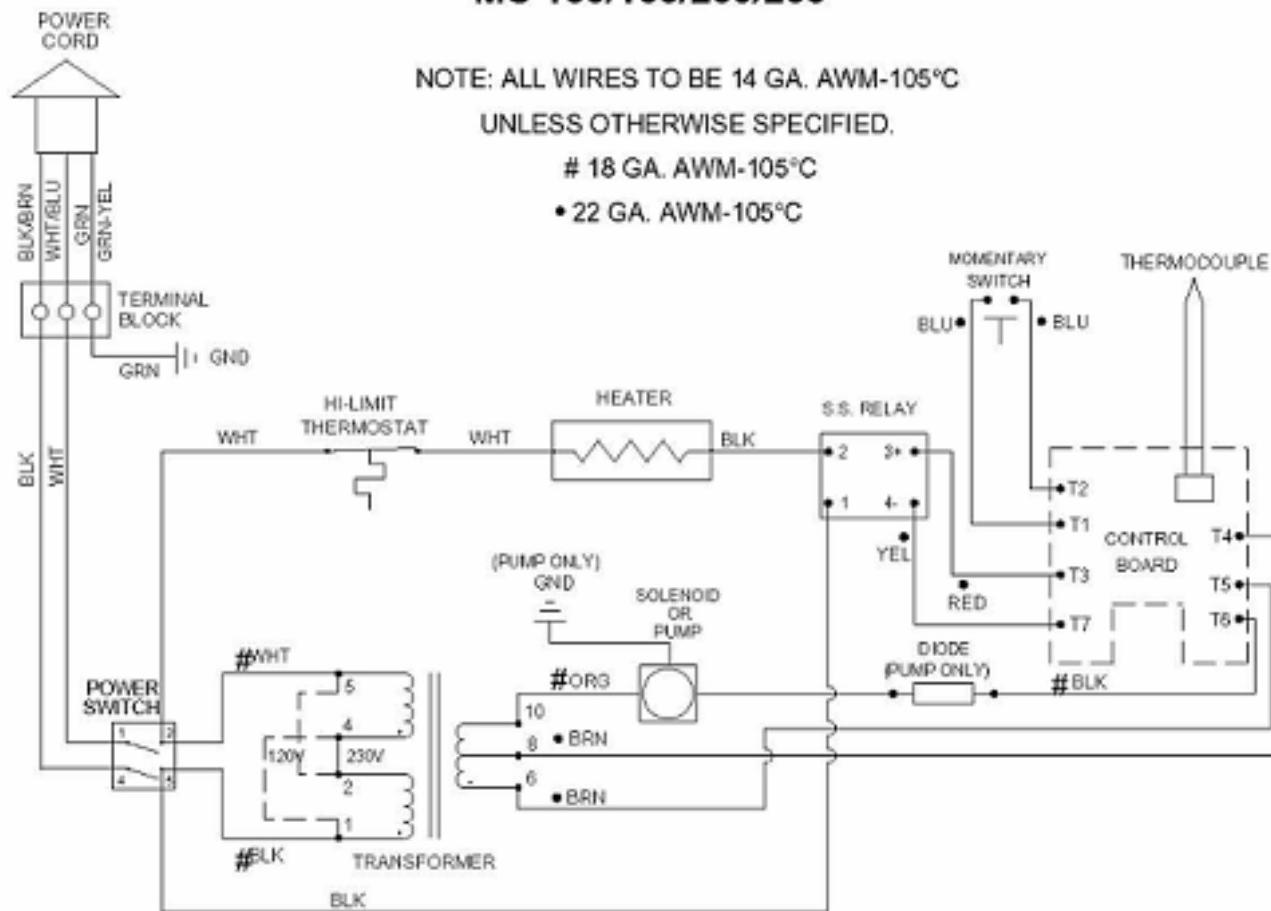
° F	MV
500	10.5
510	10.7
520	11.0
530	11.2
540	11.4
550	11.7
560	11.9
570	12.1
580	12.3
590	12.6
600	12.8

WIRING DIAGRAMS

MS-150/155/250/255

NOTE: ALL WIRES TO BE 14 GA. AWM-105°C
UNLESS OTHERWISE SPECIFIED.

- # 18 GA. AWM-105°C
- 22 GA. AWM-105°C



MS-355

NOTE: ALL WIRES TO BE 14 GA. AWM-105°C
UNLESS OTHERWISE SPECIFIED.

18 GA. AWM-105°C

• 22 GA. AWM-105°C

